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An Integro-Extremization Approach for Non Coercive and Evolution Hamilton-Jacobi Equations

We devote the *integro-extremization* method to the study of the Dirichlet problem for homogeneous Hamilton-Jacobi equations

$$\begin{cases} F(Du) = 0 & \text{in} \quad \emptyset \\ u(x) = \varphi(x) & \text{for} \quad x \in \partial\emptyset, \end{cases}$$

with a particular interest for non coercive hamiltonians F, and to the Cauchy-Dirichlet problem for the corresponding homogeneous time-dependent equations

$$\begin{cases} \frac{\partial u}{\partial t} + F(\nabla u) = 0 & \text{in} \quad]0, T[\times\emptyset \\ u(0, x) = \eta(x) & \text{for} \quad x \in \emptyset \\ u(t, x) = \psi(x) & \text{for} \quad (t, x) \in [0, T] \times \partial\emptyset. \end{cases}$$

We prove existence and some qualitative results for viscosity and almost everywhere solutions, under suitably convexity conditions on the hamiltonian F, on the domain $\emptyset$ and on the boundary datum, without any growth assumptions on F.